



T.C.M. di Tortora Gaetano e C. S.r.l.

Head Office: Via Filettine, 3 84016 Pagani (Salerno) Italy *Production Workshop:* Via De Filippo 84010 S: Valentino Torio (Salerno) Italy *Mail*: info@tmctortora.com *Phone*: +39.081.5153531 *Fax*: +39.081.5153531 The T.C.M. born in 2000, thanks to the In these years, TCM have experience gained in the construction of developed many projects in Italy and worldwide, in Food machines and plants for the food industry and in the processing of stainless steels, whi-Processing ch is fundamental in the "Food processing". complete treatment Based in one of the most renowned region for from fresh tomato both to tomato production, TCM have also gathered direct packaging thedeepItalianexperienceinthisspecificfield. cans etc.) or to

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drums).



Further complete and challenging projects have been developed both in handling and emptyingbigcommercialdrums and after packaging transport, cleaning and thermal treatment.

Business consulting

Our consulting expertise is underpinned by TCM wide engineering and project management expertise.

We deliver projects and solve problems across our sectors including food processing and packaging management industry.







Company skills



Engineering

TCM collect a national network of delivering engineers high cost-effective performance. technical services to our customers worldwide. Our approach to engineering means a common user experience for our customers, independent of location. We can deploy the best mix of our capabilities through a well-integrated work share and technical performance management system. Process, mechanical, electrical and control engineering expertise allows us to execute integrated projects, on time and within budget. innovative Sharing technologies and processes across our Engineer network drives technical quality and enhances project delivery.





Process automation

TCM have always been aware that Automation has a role kev in integrated production and thanks to the professionalism of their engineers and their competence in the processes and technologies of food processing, offers solutions realization the for of "turn-key" complete plants with integrated control and supervision.

The automation by TCM ensures proper, safe and functional operation of your processing systems and can control individual phases or production the complete process, in all the phase of their operation (production, cleaning sterilization, etc). TCM Automation includes development of customized software designed according to the customer production needs.

TCM supply directly electrical switchboard with integrated control panels.

Company skills



Construction

TCM excellence deliver in equipment directly construction. providing to the customer skid assembled units or components. Based on detailed engineering drawings and realized in a 3000 sqm construction workshop, the end product in construction depends on the quality of materials, construction practices, and the level of care and quality control in the construction process.



Construction materials

All the process equipment, with the internal mixing devices are realized in stainless steel, assembly and welding operation are realized directly by internal specialized operators.

Mixing technology TCM

developed ownership design mixing devices for each specific application

Installation:

TCM can provide directly to the installation of the equipment inside the customer workshop. With this service, TCM can support directly all the installation activities:

- Main equipment installation
 - Piping interconnecting
 - Electrical installation
- Instrument and control system
 - implementation
- Service unit installation and connection

TCM support the Customer team with instruction manual, training and start- up service.



TMC produced in last year many process lines to manage the brix control, the concentration and the pasteurization of bulk produced tomato juice. The service proposed by TCM include new lines, process revamping, production rate improvement.

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TCM is deeply involved in packaging management unit (bottles, cans, bags) for: transport operation, cleaning and drying linear cooling, spiral cooling. The service proposed by TCM include: new lines, cooling improvement, addition of cleaning facilities.





The juice incoming in a packaging line should be homogenized, cleaned and readjusted in water concentration, to remove the residual deterioration due to the previous preparation, transport and unloading operation. Concentration control, applied to the fresh juice allows to regenerate, by evaporation, the original flavor to the juice, and is main unit operation in the juice packaging plants. In the Vacuum pan unit, the control and reset of the concentration of the tomato paste is obtained with subsequent evaporations of the water contained in the juice: in order to maintain the organoleptic characteristic of the paste, the evaporation of water is done at low temperature under vacuum condition. The final step is reached in batch in 2 separated boules.



TCM usually treats these units for revamping operations, replacing service units, pumps and instruments



Concentration vacuum pans: the pans are tanks equipped with an external heating facilities by steam and with an internal anchor mixer. Each boule is connected to vacuum line (operating vacuum pressure = 0.6 bar absolute) collecting the evaporated produced inside: in this way the progressive concentration occurs at a controlled temperature around 64°C. Each boule is equipped with a cleaning device. Hereinafter a possible configuration of a vacuum pan unit (on 2 steps concentration is issued): in pan 1 the product is partially concentrated to the normal operating conditions, while a continuous recirculation in an external circuit bring the paste to two 3 way valve: one of the exit line of the valve resent the material to the boule 1, the third exit line feed new paste to the pan 2 or to the pan 3. The pans 2 and 3 will concentrate to the final requested value, and then will feed the concentrated paste to the following units.

The product concentration is measured by a specific line refractometer: till the final concentration is not reached the product is recirculated back in its origin pan.



Transfer pump: each pan is equipped with a mono positive transfer pump that actuates the recirculation of the product to the pan and sends the product to the intermediate tank prior to the pasteurization.

Service tanks: the line should be generally fed from a buffer collecting the incoming fresh juice and discharged to the concentration controlled juice in a final buffer used to fed the following pasteurization section.

Service lines: each boule should be connected to a vacuum line, the steam line and the condensate line, the clean in place line and the fresh water line (for periodical cleaning).



Forced circulation evaporator:

The equipment is used to concentrate tomato sauces in low pressure condition, starting from a raw sauce (even mixed with additives). Due to the very low pressure, the process happens at very low evaporation temperature, resulting even in a good regeneration of the color and the flavor of the sauce. TCM design this equipment for a continuous running mode.





Forced circulation evaporators



Evaporator phase separation drum: in this drum the boiling mixture passed through the evaporator is split into two fraction: the vapor fraction is finally removed to be sent in the condensation section of the plant, the liquid one is then recirculated together with a continuous flow of fresh pre- mixed sauce in the evaporator. The drum should be set in high position. It works under vacuum, to keep lower the evaporator enter the drum topside. The liquid phase is recirculated in the evaporator, after to be mixed with the continuous flow of fresh sauce coming from the previous section of the line. The tank is connected to a clean in place recirculation line feeding both 2 tank top rotating spry nozzles

Evaporator: the evaporator is vertical shell and tube heat exchanger: the recycling sauce flows inside the pipes and the steam condensate outside in the shell. The inlet flow stream is fed from the recirculating pump



Evaporator centrifugal recirculating pump: this centrifugal pump keep a constant recirculation through the evaporator and the phase separation drum. Due to its heavy operating condition the pump is equipped with a double mechanical seal with clean pressurize water as lubricating fluid.

Vacuum condenser: this second vertical shell and tube heat exchanger allows to condensate the steam removed from the product, to be wasted in the plant sewer. The condenser is provided with a cleaning device.

Service tanks: the line should be generally fed from a buffer collecting the incoming fresh juice and discharge the concentration controlled juice in a final buffer used to fed the following pasteurization section.

Service lines: the unit should be connected to a specific vacuum line, the steam line and the condensate line. clean the in place line the fresh water line and (for periodical cleaning).



Heating to medium temperature kills most of the bacteria that caused spoilage, deterioration of the juice, preventing from turning sour. This process called Pasteurization, achieves this by eliminating pathogenic microbes and lowering microbial numbers to prolong the quality of the juice. Pasteurization is used widely in food processing industries to achieve food preservation and food safety. Unlike sterilization, pasteurization is not intended to kill all microorganisms in the juice. Instead, it aims to reduce the number of viable pathogens so they are unlikely to cause disease (assuming the pasteurized product is stored as indicated and is consumed before its expiration date). Commercial-scale sterilization of food is not common because adversely affects the it taste and quality of the product.

TCM is deeply experienced in construction and installation of Pasteurization unit, even realized in skid assembly. In all plants, a double pumping system is applied combining a mono screw pump with a piston pump system. To improve the control of process temperature, an intermediate hot heating water system is also provided in the unit



Pasteurizer

Pasteurizer:



The unit is composed by the following main components

Pasteurizer tank:

a vertical pasteurizer balance tank, holding drum for the pasteurizing line, provided with a mixer to improve the homogeneity of the paste content. The drum is internally equipped with cleaning devices. The drum receive product from a tank collecting the fresh tomato paste with controlled concentration.

Mono pump:

А Mono single rotor screw pump, for the displacement of the paste from the balance tank bottom to the reciprocal piston pump: the flow rate of the pump is controlled with the motor inverter. function The of this pump keep under pressure is the suction line of the piston pump.

Piston pump:

A Piston pump, to flow the paste through the double pipe pasteurizer: the flow rate of the pump is controlled with the motor inverter.

Heat exchanger:

Multi-elements double pipe heat exchanger is the core equipment of the pasteurizer: while the tomato paste flows through the exchanger elements is heated by pressurized hot water with a countercurrent flow in the external pipe.



The temperature controlled heating water is produced in a specific subunit, where water is recirculated with a pump between an holding tank, a steam heated plate type heat exchanger and the double pipe juice heating exchanger.

Service lines:

the unit should be connected, the steam line and the condensate line, the clean in place line and the fresh water line (for periodical cleaning), to the industrial water line.

TCM

Controlled, clean and safe addition of salts. seasonings, colorants. sugars, flavor, preservatives allow to improve the quality of the processed juice in of freshness, taste, terms texture. appearance and nutritional value. This of kind unit generally are realized in 2 main section. The first section (additive loading and mixing) handles the additives, their loading in holding tanks for liquids and in holding hoppers for powders. Different metering approach can be used to prepare premixed slurries with different recipes. The second stages (final blending station) allows to add the slurries in the processed juice and to disperse it in control of time.

TCM have realized many of such unit from a simple approach to add manually weighed additives to fully automated system with metering hopper using weighing cells, intermediate mixtures and final slurry preparation tank equipped with dynamic mixers, steam heated jacket, recirculation pump and static mixers. The transfer way of the additives to the slurry preparation drum may be • simple gravity

- Piping interconnecting
- progressive dissolution with transfer pump
- vacuum transfer direct pumping



Downloading and automatic feeding of viscouse products:

Dosing and metering tanks equipped with blanding facilities and transfert pumps.

Metering and mixing

Metering and mixing:



Gravity operated or auger operated powder metering hoppers:

3 single vertical, loaded by hand, hoppers 3 metering vertical hopper fed from 3 charging hoppers augers With local movable suction cope





Controlled loading metering instruments:

3 Metering lined for juice blending

Final blending station:

Thestationequippedwithtransfertpumpsdiffractormetersandstaticmixerinsertedtherecirculationloop





Incoming raw juice transported in 0,2 ton drums or in 1,3 ton wood reinforced big bags requests high performing unloading unit to Handle the holders, moving them though a line to be quickly loaded and unloaded to move the holders from the incoming holder store to the downloading station.

Allow a safe, clean and continuous of juice content in a unloading downloading station equipped for an easy and complete juice collection inside the holders, with low dilution or juice immediate dispersion. Obtain an homogenization of the juice discharged from different holders prior to send it in the process line

TMC have realized many of such downloading station:

- with one or more motorized transfer line bringing the drum to a common juice recovery
- station
- a direct unloading of the emptied holder or a gravity line to remove them
- multi-station facilities for simultaneous unloading of more holders equipped with mecha-
- nical pumps or vacuum actuated lines to collect the juice in the holders

• a single or double collecting drum for homogenization and washing dilution of the juice



Roller conveyors for transport holders:

Zinc plated roller conveyors both motorized or gravity actuated, with adjustable transversal guides

Downloading station:



Roller rotating platform for holder orientation:

Zinc plated roller conveyor placed on a fifth wheel both motorized and manual to be placed in the unloading station





Automated collecting and homogenization tank:

Vacuum or atmospheric stirred tank equipped for automated homogenization and water control

Hoist moved vacuum actuated transfer nozzles:

Hand actuated hanged nozzle connected to a vacuum line for easy and accurate collection of the juice from the holders

Vertical trolley moving transfer pumps:

Mono pumps installed on vertical moving motorized trolley for a powerful unloading of the sauce



Equipment review

Conveyor linear cooler



The packaging of juices is done at the pasteurization temperature: when and if the bulk temperature falls down a safety limit the liquid must be recycled back to the pasteurization unit. Anyway, after the packaging unit, the packages (cans, bottles and bags) need to be cooled to a temperature adequate for handling. The transport lines are also used to collect different discharge line of different machines.



TCM realize for their customers complete unloading lines for the packaging machines. Their deep experience guide the selection of the belt configuration and material more adequate to the packages to be handled. For quickly cooling packaging, TCM recommend the use of linear coolers where packages moving on a straight belt are washed by a continuous stream of cold spry water that reduces gradually their temperature along the belt. At the end of the cooling section, in a further short section a vertical flow of air dries the package surfaces

Conveyor linear cooler



The linear coolers are applied to every different types of packaging. A special application was done by TCM the tomato paste tube dispenser. A complete set of loading and unloading devices are realized by TCM to handle carefully such a packaging system.







Linear cooler

Conveyor and linear cooler:



Conveyors:

TCM supply the different types of conveyors for horizontal and sloped transport needed to feed linear and spiral thermal treatment.

Usually the linear are equipped with plastic modulr conveyor belt designed for normal, high washing, or sloped in order to set their construction to the specific carried material and transport layout

Linear dryer cooling section:

The belt plastic net has wider opening section to improve drops flows though the belt section

Cooling water is sprinkled up and down the surface of the belt where the packages are lied.

The recirculated water is refreshed by the cooling utility available in the installation site. High performance plate heat exchanger to reduce the temperature gap.

Cooling water recirculation:

A network of horizontal pipes feeds water to the sprinklers placed on the opposite sides of the belt The exhaust water is collected in a pit down the belt, and recycled through an heat exchanger to the sprinklers

Linear dryer drying section:

Ambient air is sent at high speed on the packages surfaces to remove the water from their surfaces. is sprinkled up and down the surface of the belt where the packages are lied.





Equipment review



To load and unload the spiral cooler, to transport lines should be sloped. To improve the permanence time in the cooler, the package flow should be split into a double line proceeding coupled in the spiral cooler. The spiral cooler can have more than one entry gate and consequently the same number of exit gates. For heavier packages, for compact cooling of many product lines or even for poor cooling water facilities (cold source available at higher temperature) TMC recommend the use of spiral coolers where packages will move on a moving inside the cooler in a spiral path: such an approach will result in reduced horizontal dimensions end / or in energy saving with cooling tower application. The transport belt of the packages laid in the spiral cooler are moved either by a specific motor either from a common rotating drum entraining the transport belts on its external surface.



Spiral cooler



A new and important application of the spiral transport devices has been realized by TCM, to handle 70 to 400 gr cans for tomato paste, both for a final hot water cooking (for can sterilization) and a final cooling with fresh water.

In this special unit, 2 spiral transport system are coupled and connected with a linear can transport lines which load the first c ooker, transfer from the cooker to the cooler and finally unload the cooler. In this specific application, the pressurized water is heated till 99 °C and the final cooling is applied with cold water from cooling tower The unit, the first realization in Europe, can treat till 5,5 t / h (and 78000 cans / h)





Combined heat treatment

Divider (TCM patented)



This service equipment (available only by TCM) allows to optimize the material flow of packaging through the spiral transport devices. The divider allow to split and compact the flow of heavy packages coming from a single filling machine till to 3 separated transport lines proceeding with a lower speed. The divider application results in a more efficient spiral transport system allowing to obtain a lower exit temperature or to use a cheaper cooling media (cooling tower water)





Multiple feeding line separated treatment

The spiral cooler can be used for parallel cooling of different flow of packaged materials coming in the same time at different temperature to the spiral transport device



Cooler drum

The internal cooler drum is big rotating structure moved by a specific motor with external plastic strips to drug the internal profile of the belts. For a correct running of cooler, the tension of each single belt laid in the spiral cooler should correctly tensioned inside the cooler.



Functional safety devices:

The spiral cooler is equipped with tentioner equipped with limit switches to control the constant tension of the transport belts.





Control of package overlapping:

Special control devices allow to avoid packages overlapping which may internal entanglement of the packages between the belt rows

Control devices



TCM provide washer and dryer station directly connectable to an existing packaging lines.

The filling station of liquid in food industrymay cause external fooling to the packages. A water cleaning can remove the problem easily. Washing water can be heated to a selectable temperature, a continuous refill rate can be even selected to improve the cleaning.





In many production units, special chemical agents should be add to water to be recycled in a clean in place circuit.

TCM realize simple pneumatic devices (adjustable for each special purpose) allowing to feed in line trough quick connection joint such chemicals (even in pressure) and metering the quantities added at each single addition



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